

Verify:

$$\begin{aligned}\tan\theta\sin\theta &= \frac{1-\cos^2\theta}{\cos\theta} \\ &= \frac{\sin^2\theta}{\cos\theta} \\ &= \frac{\sin\theta}{\cos\theta} \cdot \sin\theta\end{aligned}$$

$$\tan\theta\sin\theta = \tan\theta \cdot \sin\theta \quad \checkmark$$

Verify:

$$\begin{aligned}\frac{\cos\theta}{\sec\theta+1} + \frac{\cos\theta}{\sec\theta-1} &= 2\cot^2\theta \\ \frac{\cos\theta\sec\theta - \cos\theta + \cos\theta\sec\theta + \cos\theta}{\sec^2\theta - 1}\end{aligned}$$

$$\frac{2\cos\theta\sec\theta}{\tan^2\theta}$$

$$\frac{2\cos\theta}{\tan^2\theta}$$

$$2\cot^2\theta = 2\cot^2\theta \quad \checkmark$$

Verify:

$$\begin{aligned}\csc x + 1 &= \frac{\cot^2 x}{\csc x - 1} \\ &= \frac{\cot^2 x (\csc x + 1)}{(\csc x - 1)(\csc x + 1)} \\ &= \frac{\cot^2 x (\csc x + 1)}{\csc^2 x - 1} \\ &= \frac{\cot^2 x (\csc x + 1)}{\cot^2 x}\end{aligned}$$

$$\csc x + 1 = \csc x + 1 \quad \checkmark$$

Verify: $\cot \theta + \tan \theta = \csc \theta \sec \theta$.

$$\frac{\cos \theta}{\sin \theta} + \frac{\sin \theta}{\cos \theta}$$

$$\frac{\cos^2 \theta + \sin^2 \theta}{\sin \theta \cos \theta}$$

$$\frac{1}{\sin \theta \cos \theta}$$

$$\csc \theta \sec \theta = \csc \theta \sec \theta \quad \text{✓}$$

Verify: $\frac{\sec^2 x - 1}{\sec^2 x} = \sin^2 x$

$$\frac{\tan^2 x}{\sec^2 x}$$

$$\frac{\sin^2 x}{\cos^2 x}$$

$$\frac{1}{\cos^2 x}$$

$$\sin^2 x = \sin^2 x \quad \text{✓}$$

Verify: $\frac{1}{1 - \sin \alpha} + \frac{1}{1 + \sin \alpha} = 2 \sec^2 \alpha$

$$\frac{1 + \sin \alpha + 1 - \sin \alpha}{1 - \sin^2 \alpha}$$

$$\frac{2}{\cos^2 \alpha}$$

$$2 \sec^2 \alpha = 2 \sec^2 \alpha \quad \text{✓}$$

Verify: $\tan \beta + \cot \beta = \sec \beta \csc \beta$

$$\frac{\sin \beta}{\cos \beta} + \frac{\cos \beta}{\sin \beta}$$

$$\frac{\sin^2 \beta + \cos^2 \beta}{\cos \beta \sin \beta}$$

$$\frac{1}{\cos \beta \sin \beta}$$

$$\sec \beta \csc \beta = \sec \beta \csc \beta \quad \text{✓}$$